



MASTER OF SCIENCE IN QUALITY AND PRODUCTIVITY MANAGEMENT  
M.Sc. QPM, Semester – II

Course Code	PS02CQPM51	Title of the Course	STATISTICAL QUALITY CONTROL AND RELIABILITY
Total Credits of the Course	4	Hours per Week	4

Course Objectives:	<ol style="list-style-type: none"><li>1. Assist students in learning techniques and approach of SQC being used in industry to manufacture goods and services of high quality at low cost.</li><li>2. Provide exposure to Sampling Inspection Plans.</li><li>3. Familiarize students with the concepts and evaluation procedures associated with Reliability Theory.</li></ol>
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Course Content		
Unit	Description	Weightage* (%)
1.	The meaning of quality and quality improvement, dimensions of quality, Quality engineering terminology, A brief history of quality methodology, The link between quality and productivity, quality costs, Legal aspects of quality. Brief discussion on Seven QC tools.	25
2.	Statistical Basis of Control Charts: Basic Principles, Choice of Control limits, Sample size sampling frequency, rational subgroups, analysis of pattern on control charts, discussion on sensitizing rules for control charts. Control Charts for Variable: $\bar{X}$ and R chart, and $\bar{X}$ and R chart. The $S^2$ control chart: OC function, $ARL_0$ and $ARL_1$ , Average Time to Signal (ATS), Expected number of individuals sampled (I). Control charts for individual measurements Control Charts for Attributes: $p$ , $np$ , $c$ and $u$ charts.	25
3.	Acceptance Sampling plans: Single, double & multiple sampling plans for attribute. Curtailed double sampling plans. Operating characteristic functions & other properties of the sampling plan. Use of sampling plans for rectification. Designing sampling plans. Dodge-Romig acceptance sampling plans. Acceptance sampling plan for variables with single & double specification limits. Designing variable acceptance sampling plans. AQL based sampling plans. Continuous sampling plans CSP – I & CSP – II.	25





4.	<p>Elements of Reliability: Binary coherent structure, min path/cut sets/paths, lower/upper bounds for reliability functions, k – out – of – n:G. bridge structures. Reliability availability of one unit system supported by one repair facility and one standby.</p> <p>Hazard Rate/Failure Rate, Cumulative Hazard Rate, Reliability Function. Properties of Hazard Rate. Classification of life distribution with respect to failure rate, failure rate average. Exponential, Gamma and Weibull life distributions.</p>	25
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Teaching-Learning Methodology	Interactive Class Lectures, ICT tools
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Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	15%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	15%
3.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Basic concepts of quality improvement and the methods of statistical process control.
2.	To design, use, and interpret control charts for variables and attributes.
3.	Perform analysis of process capability and measurement system capability.
4.	Understand single and double sampling inspection plans, OC and ASN functions
5.	Design, use, and interpret exponentially weighted moving average and moving average control charts.
6.	Understand censored data, Type I, Type II and random censoring schemes.
7.	Compute MLEs of parameters of various distributions for complete and censored data,
8.	Evaluate system reliability for series, parallel, k out of n systems





Suggested References:

Sr. No.	References
1.	Montgomery, D. C. (1985). <i>Introduction to Statistical Quality Control</i> , Wiley.
2.	Barlow R. E. & Proschan F. (1975). <i>Statistical Theory of Reliability &amp; Life Testing</i> , Holt, Rinehart & Winston Ins.

On-line resources to be used if available as reference material

On-line Resources

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